United States District Court
Northern District of Oklahoma

Expert Report of Michael J. McGuire, PhD, PE, BCEE

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Prepared for

State of Oklahoma, et al. v. Tyson Foods, Inc., et al.
Case No. 4:05-cv-00329-GKF-PJC

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> Watershed, including Lake Tenkiller. These increased levels of algae and other forms of waterborne organic carbon combine with the normal drinking water disinfection process to produce potentially dangerous Disinfection Byproducts, such as trihalomethanes (THMs) and haloacetic acids (HAA5s). Routine and specific sampling results have identified levels of THMs and HAA5s in drinking water distribution systems that withdraw water from the Illinois River Watershed, and these levels represent an imminent and substantial endangerment to human health."

It is hard to state strongly enough how incorrect and untrue his conclusion is. As stated in my report upon reviewing the data analyses and conclusions by Cooke and Welch and Teaf, these authors made improper comparisons between DBP values in IRW utility systems and DBP "threshold concentrations" that were created by them.

As already demonstrated in a previous section of my report, the levels of TOC in Illinois River and Lake Tenkiller water are not unusual when compared to TOC levels in hundreds of utilities across the U.S. that have had no impact from poultry litter application in their watersheds. Also, the levels of TTHM and HAA5 in IRW water utility systems were not very different from TTHM and HAA5 levels in hundreds of water utilities nationwide.

It is irresponsible for Teaf (2008a) to state that "...these levels [of DBPs] represent an imminent and substantial endangerment to human health." If Teaf was correct, the ODEQ would be forced to issue notices of "do not drink" and "do not use" to consumers of this water. If Teaf was correct and the ODEQ did not take any action, the USEPA would step in and issue a "do not use" advisory to all consumers of water from IRW utilities. Teaf is obviously wrong. Neither ODEQ nor USEPA have issued such advisories. Levels of DBPs produced by IRW utilities do NOT represent an "imminent and substantial endangerment to human health."

King Expert Report—DBPs

Error Understanding DBP Regulations

King (2008a) bases his opinion that remediation of the drinking water treatment plants is needed on his incorrect assessment that the utilities running these plants are violating DBP MCLs at an elevated level—20% to 30%. It appears that most of his information on the health risks associated with DBP occurrence was gleaned from the reports by Cooke and Welch (2008a) and Teaf (2008a). As already demonstrated, neither Cooke and Welch nor Teaf understand how DBPs are regulated or which DBP regulation is currently in force. King illustrates his own lack of understanding regarding DBP regulations on pages 142 and 143 of his deposition when he states that the Stage 2 DBPR is in force (King 2008b).

As explained several times in my report, the Stage 1 DBPR is currently in force and the Stage 2 DBPR will not be effective for systems serving <50,000 people until after 2013. If a utility was in violation of the Stage 1 DBPR, it would have to notify both the ODEQ and its consumers through its annual CCR. King does not understand the regulatory requirements under the Stage 1 and 2 DBPRs and has no basis for concluding that additional treatment is needed.

No Need for Remediation of Water Treatment Plants in the IRW

As stated on page 28-29 of my report, there are three IRW utilities that need to modify their treatment processes to come into compliance with the Stage 1 DBPR (i.e., Cherokee Co RWD #13, East Central OK and Gore PWA). All of the other IRW utilities have successfully installed simple technologies or adjusted existing treatment methods to achieve low DBP levels.

Discontinuation of poultry litter applications on fields in the IRW will have no effect on the ability of these three utilities to comply with the Stage 1 or Stage 2 DBPRs. These three utilities must install better TOC removal and move their points of chlorination just as the other utilities in the IRW have done to control the existing, background levels of TOC in the IRW water supplies. Therefore, there is no needed remediation of water treatment plants associated with poultry litter applications in the IRW.

Error with Treatment Costs for Water Treatment Plants in the IRW

King (2008a) includes in his list of IRW utilities, Cherokee County RWD #11. This utility purchases treated water from Tahlequah PWA. King was wrong to include Cherokee County RWD #11 in his analysis. As a water system purchasing treated water from Tahlequah PWA, Cherokee County RWD #11 would not incur any costs to modify treatment of that water source because they are NOT providing any treatment of the Tahlequah purchased water. Cherokee County RWD #11 has another water source that it does treat and distribute to its customers—Double Spring Creek, which is outside of the IRW. Double Spring Creek is a tributary to Fort Gibson Lake which is a watershed adjacent to the IRW. Therefore, none of his so-called remediation costs for Cherokee County RWD #11 should ever be considered in this lawsuit.

On page 30 of the King (2008a) report, he stated that treatment would be required at the five "Riverine" water treatment facilities:

> "*Costs* — Costs of this technology were estimated based on US EPA published estimates provided as part of the Federal Register when the disinfection byproduct rule was promulgated (FR Vol 71, No. 2, January 4, 2006 p. 456). Costs were escalated from 2003 dollars to 2008 dollars using the Engineering News-Record Construction Cost Index History. Four water treatment plants (WTPs) used the Illinois River for source water while one WTP used Baron Fork Creek. Capital costs for all five WTPs were estimated at a total of $220 million; annual costs were estimated to be $19 million in aggregate; and the total present worth cost over 30 years for this technology was estimated at **$452 million**." (emphasis added)

For the fourteen utilities using water from Lake Tenkiller, King (2008a) stated on page 31 his opinion on the need for additional treatment at those water treatment plants:

> "*Costs* —Costs of this technology were estimated based on US EPA published estimates provided as part of the Federal Register when the disinfection byproduct rule was promulgated (FR Vol 71, No. 2, January 4, 2006 p. 456). Costs were escalated from 2003 dollars to 2008 dollars using the Engineering News-Record Construction Cost Index

> History. Fourteen water treatment plants (WTPs) use Lake Tenkiller for source water. Capital costs for all fourteen WTPs were estimated at a total of $233 million; annual costs were estimated to be $28 million in aggregate; and the total present worth cost over 30 years for this technology was estimated at **$583 million**." (emphasis added)

Therefore, according to King, the total present worth (over 30 years) for treatment upgrades to the riverine and lake water treatment facilities would be $1,035 million. Spending over one billion dollars to install water treatment plant upgrades to control DBPs in 19 (actually 18) relatively small water treatment plants is incredibly expensive and way out of line with other Stage 1 and Stage 2 DBP regulation compliance costs. According to the ODEQ SDWIS web site, 48,820 people are served by the 19 (should be 18) IRW water utilities. That means that the 30 year net present value would be $21,200 per person which is an astonishing number and far above what was predicted for compliance costs for U.S. water utilities under the Stage 2 DBPR (USEPA 2006). The following section explores the mistake that King made to come up with his cost estimate.

As noted in the above quotes from King (2008a), he obtained his treatment costs from page 456 of the January 4, 2006, *Federal Register,* which contained the final Stage 2 DPBR. Table 11 reproduces the portion of Table VI.D-7 from page 456 that King referenced and used in his calculations (USEPA 2006).

Table 11. Capital and O&M Costs for Utilities to Comply with the Stage 2 DBPR, millions of dollars (page 456, USEPA 2006)

Source	System Classification	System Size (population served)	Capital Costs				O&M Costs			
			Mean Value	Median Value	90 Percent Confidence Bound		Mean Value	Median Value	90 Percent Confidence Bound	
					Lower (5th %tile)	Upper (95th %tile)			Lower (5th %tile)	Upper (95th %tile)
Surface Water	CWSs	<100	$ 1.09	$ 1.07	$ 0.58	$ 1.68	$ 0.20	$ 0.20	$ 0.11	$ 0.29
		100-499	$ 3.27	$ 3.22	$ 1.77	$ 4.94	$ 0.82	$ 0.82	$ 0.46	$ 1.19
		500-999	$ 3.86	$ 3.78	$ 2.08	$ 5.89	$ 0.6	$ 0.61	$ 0.34	$ 0.88
		1,000-3,299	$ 24.39	$ 24.27	$ 13.37	$ 36.07	$ 3.36	$ 3.36	$ 1.88	$ 4.86
		3,300-9,999	$ 62.23	$ 61.92	$ 34.42	$ 91.81	$ 5.32	$ 5.34	$ 2.97	$ 7.70
		10,000-49,999	$ 113.20	$ 113.98	$ 62.72	$ 157.05	$ 6.04	$ 6.00	$ 3.74	$ 8.66
		50,000-99,999	$ 67.40	$ 68.08	$ 37.41	$ 93.50	$ 3.41	$ 3.36	$ 2.13	$ 4.95
		100,000-999,999	$ 183.98	$ 186.24	$ 98.21	$ 257.75	$ 8.17	$ 7.87	$ 5.21	$ 12.52
		1,000,000+	$ 86.04	$ 86.46	$ 47.14	$ 120.41	$ 4.91	$ 4.65	$ 3.11	$ 7.73
		All Sizes	$ 545.44	$ 549.03	$ 297.70	$ 769.10	$ 32.84	$ 32.21	$ 19.95	$ 48.78

Tables 7 and 8 from the King (2008a) report summarized his cost calculations for the riverine and lake water utilities, respectively. I will use Adair Co RWD #5 as an example to show his calculations. From the table on page 456 of the *Federal Register*, King selected a median "unit" compliance cost for a utility serving surface water to 500-999 people of $3.78 million in capital costs and $0.61 million in annual O&M costs (both values circled in red on Table 11). He then multiplied both numbers by 1.2085 which he claimed accounted for the increase in the *Engineering News-Record* construction cost escalation between 2003 and 2008. Multiplying an O&M cost by a construction cost escalation factor is a problem in itself, but there were far more serious mistakes made by King.

After his cost escalation adjustment for the Adair Co RWD #5 example, he arrived at a "unit" capital cost of $4.57 million and a "unit" O&M cost of $0.74 million. **"Unit" costs in this context means the cost to install or operate treatment to meet the Stage 2 DBPR in *ONE* treatment plant.** These values can be found on Table 7 in his report. The problem with his calculation is that the costs he took off of the table on page 456 of the *Federal Register* were NOT "unit" costs. These costs were the ***ENTIRE NATIONAL COMPLIANCE COSTS*** for utilities across the U.S. that fell into that population category. In other words, the capital costs for ALL community water systems in the U.S. using surface water in the population-served range of 500 to 999 people was estimated by the USEPA to cost $3.78 million (value circled in red on my Table 11). This is a mistake by King of such immense magnitude that it is difficult for me to describe or for the reader of my report to appreciate.

So there is no misunderstanding the size of the mistake made by King, the reader will note that on Table VI.D-7 on page 465 of the *Federal Register* (USEPA 2006) that the **TOTAL CAPITAL COST FOR THE STAGE 2 DBPR FOR THE ENTIRE U.S. was estimated to be $842.98 million**. The total capital costs presented by King were **$453 million** for 18 small treatment plants. The document referenced in the footnote to Table VI.D-7 on page 465 of the *Federal Register* details how the numbers on the table were determined (USEPA 2005a). On page 7-27 of the referenced document (USEPA 2005a) are the two tables that contained the **unit treatment costs** for different population categories—7.10a Capital Unit Costs ($/Plant) for CWS Surface Water Plants and 7.10b Annual O&M Unit Costs ($/Plant/Year) for CWS Surface Water Plants.

Appendix J (USEPA 2005b) of the cost document contains the same table as shown on page 456 of the *Federal Register*. In Appendix J, the title of the table is specific: Exhibit J.1a Total Stage 2 DBPR Capital and O&M Costs – PWSs.

We can get some insight into how King could have made such an incredible mistake by reviewing his deposition. On pages 199 to 200 of his deposition (King 2008b), the following question and answer exchanges took place:

> "Q Okay. The EPA document that you're referring to is a Federal Register, Volume 71, No. 2, January 4, 2006. It's referenced on Page 30 of your report.
> A Yep.
> Q Okay. Who told you to use that section?

A Jana (sic) Skadsen found that for me.
Q What's Jana's background?
A She's a water treatment plant operator, retired from the City of Ann Arbor and currently works for us [CDM].
...
Q Okay. Did you have to perform any calculations with respect to the information contained in the Federal Register, Volume 71, Number 2?
A I believe I read directly off the table and multiplied it by the number of users.
Q Okay.
A Or, actually I might have taken the number of users and then just plugged in the number.
THE REPORTER: I'm sorry.
Q Okay.
A Looked at the number of users for a particular plant and read the associated costs as part of the area capital output volume.
Q Okay. And you were provided with a number of users of each of those plants?
A Yes, sir.
Q Where did you get that information?
A Boy, I don't recall. That should be in the e-mail records, though."

King was obviously not familiar with the DBP regulation in the *Federal Register* and asked Janice Skadsen on the CDM staff to pull out the relevant cost information. Because he did not know what the table on page 456 meant, he mistakenly assumed that the numbers on the table were **unit costs** instead of **national compliance costs**. Regardless of how he made the mistake, his cost calculations are totally wrong and should not be considered for any purpose.

Even if King had not made the incredible calculation mistakes detailed in this section of my report, any costs that he came up with would have been irrelevant. As stated previously in my report as part of my rebuttal of the Cooke and Welch (2008a) and Teaf (2008a) reports, there is no need to cure "human health concerns" associated with DBPs in water served by IRW water utilities taking water from the Illinois River or Lake Tenkiller. Therefore, there are no costs because no injury has been demonstrated by Cooke and Welch, Teaf or King.

Mistake with Population Categories

As an important footnote to the mistakes King (2008a) made in calculating costs, King used the wrong population cost categories from the table on page 456 of the Federal Register in four cases. Table 12 lists all 19 of the utilities for which he evaluated costs and identified the populations served for each based on data from the ODEQ. In the adjoining column is the population category that he used in miscalculating the compliance costs for IRW utilities. Four of the utilities were miscategorized according to their populations served. Obviously, there was no quality control exercised over King's calculation method, his data source or his water utility populations served.

Table 12. Population Categories Used by King and Associated Errors

Water Utility Name	Population Served*, [a]	Population Category Used by King From p. 456 FR
Adair Co RWD 5	950	500-999
Burnt Cabin RWD	118	100-499
Cherokee CO 2 (Keys)	1,239	1,000-3,299
Cherokee CO 11	3,088	3,300-9,999
Chrokee CO RWD 13	2,120	1,000-3,299
East Central OK	1,200	1,000-3,299
Fin Feather Resort	150	100-499
Flint Ridge RWD	1,300	1,000-3,299
GORE PWA	1,688	1,000-3,299
LRED (Chicken Creek)	302	100-499
LRED (Lakewood)	250	100-499
LRED (Wildcat)	250	100-499
LRED (Woodhaven)	200	100-499
Pettit MT Water	90	100-499
Sequoyah Co RWD 5	1,075	1,000-3,299
Sequoyah County Water Asso	15,719	50,000-99,999
Tahlequah PWA	18,431	50,000-99,999
Tenkiller Aqua Park	150	100-499
Tenkiller Utility Co	500	500-999
Total	48,820	

*Source: ODEQ SDWIS web site, http://sdwis.deq.state.ok.us/index.jsp
a Includes retail and wholesale population served
Note: Shaded cells indicate an incorrect population range chosen by King

McGuire Expert Opinion #1--DBPs

It is my opinion, based on a reasonable degree of scientific certainty, that application of poultry litter to fields in the IRW has no discernable impact on the levels of total organic carbon in IRW waters. The production of trihalomethanes and haloacetic acids in water served by utilities providing drinking water from Lake Tenkiller and the Illinois River cannot be linked to the application of poultry litter in the IRW. The only DBP MCL compliance problems in the IRW are associated with three utilities (out of 18) and are caused by ineffective design or operation of their treatment facilities and not poultry litter. It is also my opinion that there is no imminent and substantial endangerment to human health associated with disinfection by-products in drinking water served by IRW utilities.